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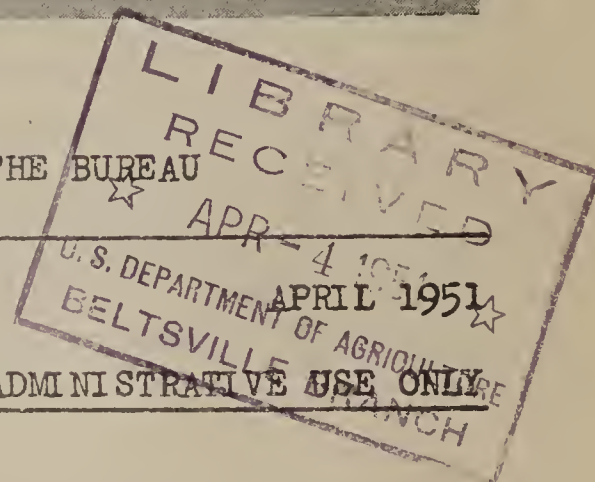
# B P I S A E

## RESEARCH ACTIVITIES

PLEASE CIRCULATE TO ALL INTERESTED EMPLOYEES OF THE BUREAU

PLANT INDUSTRY STATION, BELTSVILLE, MD.

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### Improvement of U.S. Grasslands

The National Grasslands Program on which USDA and the Land-Grant Colleges have recently embarked is expected to be unusually effective in channeling many of this Bureau's findings directly to the farm. In turn, these findings will help achieve the Program's objectives to bring the grasslands of this country to a higher level of productivity, to increase the output of livestock and livestock products, and to build up the soil.

The fact that we now have much of the know-how to do these things is an encouraging commentary on the store of knowledge accumulated during the comparatively brief time--only 15 years--that Bureau investigations along these lines have been in progress. Bureau contributions as the Program gets underway include:

First, new varieties of highly productive grasses and legumes, well adapted to the soil and climatic conditions of specific areas, highly resistant to disease, and more palatable and nutritious than forage crops now commonly grown. Among these are Coastal Bermuda, Tift sudan grass, Starr millet, and an improved Johnson grass and crimson reseeding clovers for the South; new southern type bromes for the Corn Belt; Kenland red clover, Buffalo, Ranger, and Atlantic alfalfas for the humid East and irrigated pastures of the West; sand love grass for the Southern Great Plains. Others are in prospect. It will take several years to fill all varietal needs.

Second, through the Foundation Seed Project established by this Bureau and other USDA and State agencies in 1949, a record amount of certified seed of improved varieties. Available for 1951 plantings are more than 6 million pounds of Buffalo and Ranger alfalfa seed, nearly 5 million pounds of Ladino clover, more than a million pounds of southern-type brome seed. This supply is remarkable in view of the small amount of certified seed of improved varieties available only a year ago. But it is just a drop in the bucket in the light of national needs.



Third, a better understanding of the role of grasslands in the whole farm plan; more effective methods of pasture renovation; recommendations for increased fertilization, productive and compatible combinations of grasses and legumes, lower seeding rates for adapted species; new methods of weed control, particularly in the use of chemicals on brush pests of the range; grazing management to obtain the highest livestock gains and keep pastures in production; and improved ways to preserve the surplus as hay and silage.

Fourth, improved techniques for harvesting, storing, stockpiling, and distributing seed of improved varieties.

This brief outline covers only the major contributions. They are impressive. However, we must keep in mind that the reservoir of research findings is by no means adequately filled and it will be steadily drained as the National Grasslands Program is more widely accepted. This means we must continually strengthen the research, tap every resource at our command if we are to keep the information flowing. In other words, the National Grasslands Program will serve as a powerful incentive to speed up and strengthen research in all phases of this Bureau's work related to grasslands agriculture.

Sincerely yours,



Chief of Bureau

#### Plant Hormones Speed Growth in Seedlings

Encouraging evidence that plant hormones, extracted from immature seed, can be used to speed up the development of young plants is coming from research directed by John W. Mitchell (F&VC&D).

In a recent study Dr. Mitchell, Dorothy P. Skaggs, and W. Powell Anderson obtained striking results in Black Valentine bean seedlings treated with hormones extracted from seed of the same species. They prepared the extract by soaking freshly collected samples of whole seed in moist ether at room temperature for 18 to 24 hours, evaporating the ether, and then mixing the residue with a lanolin carrier.

The treated seedlings responded to the added hormones with rapid, vigorous growth. They developed trifoliate leaves at a much more rapid rate and flowers from 3 to 5 days earlier than the untreated ones.

The hormones also proved an effective growth stimulus when applied in minute amounts to the cotyledons of bean seeds that had just broken their coats in germination. Within  $2\frac{1}{2}$  days young plants from treated seed were growing much more vigorously than the controls. At 10 days the hypocotyls of the treated plants were 10 percent larger, the first internode nearly 50 percent longer, the second internode more than 65 percent longer, the third internode 100 percent longer, and the leaf area nearly 28 percent greater than those of untreated checks.

The extract stimulated growth in seedlings when applied to the young, succulent portion of their stems but had no effect on the more mature parts of the stem.



## A Look Ahead at the Missouri Basin

Results of two years research on irrigation agriculture in the Missouri Basin underscore some of the difficulties and suggest opportunities for using additional water on farms of that region, says R.Q. Parks (Soils).

The water will be made available through the Missouri Basin development program, which covers more than a half million square miles in 7 States. Authorized by Congress in 1944, the program is an inter-agency affair with Army Engineers and Interior in charge of construction. USDA and the State Experiment Stations in the Basin are responsible for soil surveys and research on agricultural production.

Cooperative investigations in pasture and forage management, adaptation of grasses and legumes, and fertilization of sod and row crops are in progress on development farms at Bowbells and Mandan, N.Dak. and Redfield and Huron, S. Dak. Preliminary findings indicate that with additional water many farmers will be able to add small acreages of fruits, vegetables, and forage to their operations.

It is apparent, says Dr. Parks, that many lessons gained in Western experience can not be applied in the Missouri Basin because of great differences in soils and climate.

Highlighting some of the problems, Dr. Parks points out that much of the Missouri Basin land is gently rolling, the soils are thin. Large areas are made up of glacial soils where irregular or kettle hole topography makes both distribution of water and surface drainage difficult. Many soils and substrata have poor permeability. Salts occur within some of the soil profiles.

Compared with the West, the growing season in the Missouri Basin is short. The irrigation season will be shorter and rainfall will furnish much of the water needed by crops. Only one or two irrigations may be required annually. However, when dry weather occurs, all fields in the entire area will need irrigation at the same time. This points to a need for more study of most economical methods of supplementing the normal rainfall for dependable crop production in this region.

### Shorter Name, Broader Service

Official sanction has followed popular usage and shortened the name of the U.S. Salinity and Rubidoux Laboratories at Riverside, Calif., to U.S. Salinity Laboratory. At the same time the research program has been expanded to serve North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas.

Established in 1938 under the Bankhead-Jones Act for the study of salinity and alkali problems in irrigation, the Laboratory has been the center of cooperative research with 11 Western States and Hawaii. A collaborators' committee, composed of a representative from each of the Experiment Stations, coordinates the program and reviews the work of the Laboratory staff.



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 \* NEW VARIETIES IN 1951 \*  
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AURA carnation has been released to propagators through the Society of American Florists and Ornamental Horticulturists. The full, deep flower--from  $3\frac{1}{2}$  to  $4\frac{1}{2}$  inches in diameter--is a light yellow orange with red markings. The stems are long and heavy and they have numerous lateral shoots at the base, which make rapid propagation possible. Somewhat late in coming into flower, the new variety produces a heavy crop. It is recommended for greenhouse culture rather than growing outdoors where it is subject to some of the leaf diseases. Aura comes from a cross made in 1947 between two unnamed seedlings. It has been grown for three years at Beltsville and for a year by cooperating florists in Maryland and Pennsylvania as seedling No. 47-52-2.

REED and POTOMAC are hardy new filbert varieties for the Northeast. The first is named for the late C.A. Reed, who originated the new filberts by crossing the Rush variety of the American filbert with the European filbert. John W. McKay, H. L. Crane, and Mr. Reed made the selections about 10 years ago with the help of growers and associates.

The Reed bears an attractive red, round nut with a thin shell and 48 percent kernel. The nuts run an average of 180 to 190 to the pound. At Beltsville the trees blossom usually about the first of March and mature during the first two weeks of September.

Although slightly less vigorous in growth than the Reed, the Potomac bears more catkins and pistillate flowers. The two varieties blossom about the same time and should be interplanted to insure cross-pollination. The longer red nuts of the Potomac variety average 185 to 195 to the pound and have 50 percent kernel.

Both varieties are suggested for planting in the northeast except possibly the extreme northern parts of the area. Dormant catkins have withstood temperatures of 15 degrees below zero in tests the past 8 years and catkins at the "loose" stage, shortly before shedding pollen, will withstand zero weather. Planting stock has been increased by commercial nurserymen under agreement with the Bureau.

EDDA barley and GOLDEN RAIN oats are new varieties introduced from Sweden and tested for the past 5 years at the Matanuska and Fairbanks Stations for Alaska. Through the cooperative efforts of the Montana and Idaho Stations and two seed growers at Aberdeen, Idaho, the Alaska Stations have increased the seed supply of these two varieties to more than 20 tons for 1951 plantings.

EDDA is a hulled, six-rowed, rough awned, early-maturing spring barley. Resistance to lodging, high test weight, and high yielding ability make it an outstanding addition to Alaskan agriculture. At the Manatuska Station in 5-year trials average yields for Edda were 54.1 bushels per acre, for Olli 43.7 and for Trapmar, 33.8. At Fairbanks during the same period the yields were 40.6 for Edda, 36.4 for Olli, and 31.2 for Trapmar.

GOLDEN RAIN is a midseason to early maturing oats, a few days earlier than the well known Climax variety. It is characterized by earliness, stiff straw, high test weight and good yields. It is recommended for seed production, hay and silage.



GEORGIA 103 and GEORGIA 281, corn hybrids, have been released for 1951 plantings. The first, developed at Experiment, Ga., is a white, midseason hybrid. It has good stalks and root strength and is fairly resistant to lodging and to weevils. In trials conducted in 1949 and 1950, the new variety has given two-year average yields of 55.9 bushels per acre in the Coastal Plain, 73.5 bushels per acre in North Georgia, and 68.4 bushels per acre in the Piedmont. It is recommended for planting in the Piedmont and Upper Coastal Plain. GEORGIA 281 was developed at the Coastal Plain Station. A white, full season hybrid, which requires 80 days from planting to mid-silk, it produces rather tall plants, small to medium size ears. Average yields in 1950 tests were 48.6 bushels per acre. The ear count was 129 per 100 plants. The record shows nearly 82 percent of the plants were erect at maturity, only 14.7 percent of the ears were weevily. That indicates unusually good resistance to weevils in the Coastal Plain.

#### Frenching Related to Soil Flora

The hypothesis that a soil flora may cause frenching in tobacco is advanced by Robert A. Steinberg (TM&SC). His evidence suggests that frenching is due to a disturbance of protein metabolism in the plant. This appears to be brought about by a toxin manufactured by the organism, Bacillus cereus. The factors involved are totally different from those in classical parasitism.

Frenching, a non-infectious disease, has been observed wherever the crop is grown. It is characterized by a network of yellowing leaves, dwarfing of stems and branches, formation of strap-leaves, and a greatly increased number of strap-shaped leaves.

The often transitory and unpredictable nature of the disease has made research difficult. It strikes without warning in fields where it has not been observed before. It may disappear from the location even though control measures are not known. It may show up in the tobacco at any stage of growth from seedbed to plants ready for topping. The plant may recover spontaneously if transplanted to other soil. Tobacco plants grown in the greenhouse in soils from frenched fields appear to recover within 3 or 4 months but seedlings then planted on the same soil are likely to be affected.

Dr. Steinberg's first clue that the disease might be related to a soil microflora came from an extensive study of the effects of natural amino acids on tobacco seedlings grown in an aseptic culture. Data showed many free amino acids to be toxic to the seedlings. Each brought distinctive reactions. Isoleucine reproduced the symptoms of frenching step by step. No free isoleucine could, however, be found in affected soils. A survey of some 60 common species of strains of soil bacteria revealed that in pure culture, only one--B. cereus--was clearly capable of reproducing the symptoms of frenching.

During the summer of 1950 Dr. Steinberg collected--from 7 different farms--samples of soils growing normal and severely frenched tobacco together with the roots of the tobacco plants. With the aid of Dr. Francis E. Clark (Soils) he found higher populations of B. cereus were present in six of seven paired samples of soil. Dr. Steinberg points out that disturbances in the biological equilibria in the soil or between the plant and the soil that enable B. cereus to develop excessively could well lead to the transitory appearance of the symptoms of frenching.



### McKibben Reports on Tillage Lab

A better understanding of soil-tool relationship is the first step toward improving the design of tillage machinery and making ideal use of the 300 million acres of tilled land in this country. In a Bureau seminar at Beltsville, March 1, E. T. McKibben, agricultural engineer, described how these new relationships are being determined at the U.S. Tillage Machinery Laboratory, Auburn, Ala., and showed colored movies of the equipment.

Built in the early 1930's, the laboratory is equipped with large, shallow rectangular beds for 10 soils: Norfolk sand, Davidson loam, and Decatur, Davidson, Eutaw, Cecil, Oktibbeha, Houston, Sharkey, and Lufkin clay. Mr. McKibben says that while these are representative they should include a good silt loam and probably a peat or muck soil to give a complete picture of soil and tillage problems in the South.

The laboratory allows control of some soil conditions and permits the repetitive operation of equipment. During the 15 years it has been established--it was used by Army Ordnance and the Air Force during World War II--more than 12 thousand tests have been run. Fifteen commercial farm machinery companies have cooperated with USDA in tests on machine design. Results of the studies are showing up in improved designs of tillage machinery now coming to market. On the basis of the findings the companies have dropped inferior, unneeded designs, established principles to improve designs, and speeded up production of some of these improvements. For example, a moldboard plow with a simplified, low-cost share was marketed at least a year earlier than would have been possible without the tests.

### Gains in Tristeza Research

Theodore J. Grant (F&VC&D) returned in March from Campinas, Brazil where he has spent the past 3 years working with Latin-American scientists in the evaluation of citrus rootstocks and varieties for susceptibility to the tristeza disease.

While in Brazil Dr. Grant has cooperated with Dr. Costa and Dr. Moriera of the Campinas staff to study symptoms of tristeza in hundreds of citrus varieties used both as rootstocks and as scions. The information obtained on susceptible rootstocks is of world wide significance and will be of great value to the citrus industry of this country if major producing areas become infested with the virus. The research also demonstrates that there are a number of strains of the virus, some extremely mild. However, the effects on grapefruit are damaging regardless of the rootstock used.

Dr. Grant tells us that he and his Latin-American colleagues have some evidence that tristeza may be related to two citrus diseases of Africa. These are seedling lime disease of the Gold Coast and the so-called stem-pitting of grapefruits in South America. In Brazil stem pitting symptoms have been observed in certain varieties of limes, lemons, grapefruits, sweet oranges, and trifoliate hybrids affected with tristeza. It is possible that stem pitting symptoms may be helpful in the early diagnosis of tristeza. Where these occur the presence of the disease can be confirmed by budding onto key lime seedlings. Dr. Grant has been assigned to the Citrus Laboratory at Orlando, Fla.



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 \* MEETINGS \*  
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Virus-free planting material of 4 strawberry varieties for the Eastern United States is being turned over to nurserymen for increase this spring, J.B. Demaree (F&VC&D) told a conference of research and regulatory workers and nurserymen from New Jersey, Pennsylvania, Delaware, and Maryland at Beltsville, Mar. 2.

Virus-free stocks of the Kenmore, Klondike, Tennessee Shipper, and Tennessee Beauty varieties are the first to come out of the project in which Mr. Demaree and E. P. Marcus, Jr., are indexing a large number of varieties to obtain virus-free plants. They will have stocks of 8 or 10 more varieties ready for release next spring.

The visitors saw a demonstration of the technique in which Fragaria vesca is used as the indexing plant, observed symptoms of the disease, and noted the relative frequency of occurrence. The virus disease, now causing serious losses in Eastern plantings, is transmitted by aphids. Virus-free plants offer the best measure of control. They can be protected from aphid infestation in the field by dusting during the summer with parathion.

The Potomac Phytopathological Society named 3 Bureau scientists as officers for the coming year at the annual meeting at Plant Industry Station, Feb. 27-28. S.P. Doolittle will serve as president, J.B. Demaree as vice-president, and Rex Thomas, secretary-treasurer.

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 \* BOOK NOTES \*  
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"Native Orchids of North America, North of Mexico," by D.S. Correll (PEI) Vol. 26 in a new series of plant science books edited by Franz Verdoorn and published by Chronica Botanica Co., Waltham, Mass. 377 pp., 146 plates, glossary and indexes of scientific and popular names.

The book assembles for the first time detailed descriptions of each species of orchid on this continent north of Mexico. The information is based on Dr. Correll's extensive collections and the records of herbaria in the United States and Canada. The text is beautifully illustrated with drawings by Mrs. Oakes Ames and Gordon W. Dilling. The cultural notes were prepared by Edgar T. Wherry, University of Pennsylvania, and John V. Watkins, University of Florida.

Chestnut Blight Spreading in Europe

G. F. Gravatt (FP) who spent 4 months in Europe last fall on an ECA assignment to survey diseases of forest trees, reports that chestnut blight is rapidly spreading in Italy and Switzerland. In Italy the chestnut blight fungus is also attacking three important oaks - Quercus ilex, Q. sessiliflora, and Q. pubescens. The susceptibility of these oaks contrasts with the resistance of the many American oaks exposed to blight in the United States. Here only the post oak, Quercus stellata, has so far been severely attacked by this fungus.



### Weed Researchers Transferred

New assignments for two staff members of the Division of Weed Investigations and the appointment of additional members to the staff are announced by R. L. Lovvorn. Fred Arle has transferred from Phoenix, Ariz. to Crystal City, Texas, to aid in the guayule project. Charles R. Swanson has moved from Fargo, N. Dak. to Beltsville to work on physiological problems associated with herbicides. Don Kratochvil, who obtained his MS degree from South Dakota College in December, has reported to work in Fargo, N. Dak. to conduct research on weeds in sugar beets.

In June, L. M. Stahler will move his headquarters from Brookings, S. Dak. to Columbia, Mo., where he will work with S. W. McBirney, agricultural engineer formerly in charge of sugar-beet harvesting machinery research at Fort Collins, Colo., but now in charge of the weed machinery program. The new plan will provide for closer cooperation between the biological and engineering phases of the research and a more central location in the region.

### Martin in Charge of Visitors

John H. Martin (CC&D) has been assigned the responsibility for training and travel programs designed to acquaint foreign scientists and officials with the plant sciences and the work of this Bureau. Similar positions, financed by ECA funds, have been set up in each of the ARA Bureaus to care for an increasing number of visitors being brought to this country by ECA. As time permits Dr. Martin will also handle programs for other visiting groups to Plant Industry Station. He will continue to direct the project on sorghum investigations.

### Grass Experts to Europe

C.S. Aamodt (FC&D) and F.S. Prince, University of New Hampshire, are in Europe on an ECA assignment to survey possibilities for improving grasslands in Portugal, France, French North Africa, Italy, Greece, and Turkey. They will review their findings and make recommendations in Rome in early June.

### Two Key Posts in Cereals Division Filled

K. S. Quisenberry (CC&D) announces the appointment of H.A. Rodenhiser as assistant head of the Division and E.R. Ausemus as Coordinator of the Cooperative Hard Red Spring Wheat Improvement Program.

Dr. Rodenhiser joined the Bureau staff in 1930 while a graduate student at the University of Minnesota. He is a native of Massachusetts and did his undergraduate work at the University of New Hampshire. During the past 20 years he has made a number of outstanding contributions to the control of cereal smuts and rots. He will continue research in this field along with his other duties.

Dr. Ausemus will continue his headquarters at the University of Minnesota where he has served on the Bureau staff since 1929. A native of Kansas, a graduate of Kansas State and Washington State, he did his graduate work at Minnesota. In the new position he succeeds J. Allen Clark, who retired March 31.



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 \* RETIREMENTS \*  
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J. Allan Clark (CC&D), widely known for his work on the improvement of spring wheats, retired March 31. Mr. Clark was born in North Dakota. He attended North Dakota College and the University of Minnesota and joined the Bureau as a scientific assistant in 1911. During his 40 years of service he has played a major role in the development of stem rust resistant varieties of spring wheat. The new and now widely grown Cadet and Pilot varieties originated from his breeding work and he helped set the breeding objectives and select the parent material for a number of other superior varieties. Mr. Clark aided in the organization of the Cooperative Regional Spring Wheat Improvement Program and has served as coordinator since the Program was started in 1928. For several years he has served on the varietal standardization committee of the American Society of Agronomy.

Reuben Pinckney (Soils) retired Feb. 28 after 15 years of service. Dr. Pinckney who came to the Bureau from SCS, served in the phosphate section of fertilizer investigations. He was educated at Wesleyan University of Nebraska, the University of Nebraska, and the University of Minnesota.

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Glenn Dale Azaleas Shown in New York

Few people who visited the International Flower Show in New York recently could overlook the 40 varieties of large flowered Glenn Dale hybrid azaleas developed by B.Y. Morrison. The azaleas, that formed a part of the "Model Main Street" planting of the Garden Club of America, are from the extensive plantings at the National Arboretum. All of the 425 varieties selected from about 70 thousand seedlings have been grown successfully as far North as Huntington, L.I. The last of the Glenn Dale hybrids are expected to be available to nurseries by the end of 1951.

Dodge on Extension Staff

J. Robert Dodge (FB&RH) has joined the Extension staff on a part-time basis to aid extension architects, agricultural engineers, and home economists on problems of housing and farm structures. He will continue his work in this Bureau and BHNHE in the preparation of farm building plans and publications dealing with them.

Fraternity Honors Emsweller

S.L. Emsweller (F&VC&D) was initiated in Pi Alpha Xi, national honorary floricultural fraternity, in ceremonies at Baltimore, March 5. His election to the organization was in recognition of his "many fine contributions to floricultural science and for setting an exceptionally high standard of research through his professional career."

Nutritional Lab under Bureau Administration

We're late in reporting the news that the administration of the Plant, Soil and Nutrition Laboratory at Ithaca, New York, was transferred from ARA to this Bureau July 1, 1950, and assigned to the Soils Division. Line projects now in progress at the laboratory cover:

- (1) Studies of the effects of soil and geological conditions on the composition of forages and other crops in relation to the nutritional troubles in animals.
- (2) Factors involved in the production of crops of high nutritive quality.
- (3) Effect of environment, soil type, and soil management on the nutritive quality of crops as measured by animal growth, health, and reproduction.
- (4) Nutrition of animals in relation to certain endemic diseases with particular emphasis on the minor elements.
- (5) Survey of tissue composition of farm animals in relation to endemic nutritional disorders.

Guayule Personnel Expanded

H. M. Tysdal (RPI) reports that the following Bureau staff members have taken temporary assignments to give technical assistance to the Production and Marketing Administration in the establishment of guayule nurseries near Crystal City, Texas.

A.S. Hunter, soil scientist who works in cooperation with the Oregon Experiment Station, spent January and February on detail with PMA to study soil problems in the area in connection with the selection of nursery sites.

W.A. Campbell (FP) with headquarters at Athens, Ga., was detailed to check the disease situation in the area under consideration.

R.M. Ramp and J.W. Morris, agricultural engineers stationed at Houma, La., are working on principles for designing machinery to plant and harvest the guayule crop.

Agronomic research on guayule production in Texas has been in progress since 1948 under the direction of F.A. Franks (RPI).

L.M. Burtch, who has been doing graduate work this past year at Rutgers, has returned to the Division to take charge of guayule seed increase work at Salinas, Calif.